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A Report

FDP on Integrating Data Analytics with Nanotechnology in Pharmacology: Paving the Way for Innovative Drug Development

**RESEARCH & DEVELOPMENT CELL
AND DEPARTMENT OF BIOTECHONOLOGY
IN ASSOCIATION WITH
KARNATAKA SCIENCE AND TECHNOLOGY ACADEMY
(KSTA) , DEPARTMENT OF SCIENCE & TECHNOLOGY,
GOVERNMENTOF KARANTAKA**

20 -24 JANUARY 2025

RESEARCH AND DEVELOPMENT CELL

Department of Biotechnology

In Association with

on

Karnataka Science and Technology Academy (KSTA)

Department of Science and Technology, Government of Karnataka

ORGANIZED

A Five-Days FDP (online)

Integrating Data Analytics with Nanotechnology in Pharmacology:

Paving the way for Innovative Drug Development

Date: January 20th -24th 2025

Preamble:

Surana College is committed to being the educational institution of preferred choice by fostering a convergence of knowledge, skills, and values through holistic education. Guided by its vision to nurture creativity, positive attitudes, and leadership qualities, the college aims to enhance employability, promote entrepreneurship, and instil a research-driven culture among its students. Upholding core values of integrity, excellence, inclusiveness, innovation, and social responsibility, Surana College emphasizes its mission to sensitize students toward social responsibilities while equipping them with essential life skills. With a steadfast quality policy focused on value-based education, innovative teaching-learning practices, and continuous improvement, the institution strives to meet stakeholder expectations and ensure a comprehensive development experience for every learner.

The Research & Development Cell, Department of Biotechnology, in association with the Karnataka Science and Technology Academy, had organized a Five-Day Faculty Development Program (FDP) on **"Integrating Data Analytics with Nanotechnology in Pharmacology: Paving the Way for Innovative Drug Development." The program was held from January 20 to January 24, 2025, between 2:00 PM and 4:00 PM (IST) on the Zoom platform**.

This FDP program aimed to provide insights into the intersection of nanotechnology and data analytics focusing on their applications in pharmacology for the development of innovative and targeted drug delivery systems. Faculty members and researchers were exposed to cutting-edge advancements and techniques that bridge technology and healthcare, fostering interdisciplinary collaboration and skill enhancement. Participants were encouraged to make the most of this opportunity to enhance their knowledge and expertise in this rapidly evolving field.

Objectives:

- To provide the knowledge in pharmacological nanotechnology, focusing on nanocarriers and nanoscale systems to enhance drug delivery.

- To explore data analytics to enhance the nanomedicine discovery and therapeutic efficacy.

- To explore advanced computational and machine learning tools used in nanotechnology for predictive modelling, drug-target interaction analysis, and safety profiling.

- To encourage interdisciplinary collaboration by integrating concepts from pharmacology, nanotechnology, and data science by facilitating innovative approaches to tackling complex challenges in drug development.

Technical Session 1

Date: 20th January 2025.

Time: 2:00-3:30 PM

Resource Person: Dr Ishan Pandey Scientist-C, DHR-MRU, Moti Lal Nehru Medical College (MLNMC), Prayagraj

Topic: Advanced Nano pharmacology and Innovative Drug Delivery Systems: Exploring the Future of Targeted Therapeutics.

Report on Technical Session 1

The lecture was delivered by **Dr Ishan Pandey**, Scientist-C at DHR-MRU, Moti Lal Nehru Medical College (MLNMC), Prayagraj. Dr Pandey highlighted the transformative role of nanotechnology in revolutionizing drug delivery systems.

He explained how nano pharmacology enables the development of targeted drug delivery mechanisms, improving the precision of therapeutics and minimizing side effects. The session emphasized advancements in nanocarriers such as liposomes, nanoparticles, and dendrimers for delivering drugs to specific sites, particularly in cancer therapy and genetic disorders. Dr Pandey also shed light on the importance of controlled drug release systems, which ensure optimal therapeutic outcomes over extended periods.

The lecture further delved into the integration of theragnostic, combining diagnostic and therapeutic capabilities in a single nano system. Dr. Pandey discussed emerging trends such as smart drug delivery systems that respond to stimuli like pH, temperature, and light. He concluded by emphasizing the potential of these innovations to redefine modern medicine, particularly in personalized treatments and non-invasive therapeutic approaches.

The session was highly informative and inspired participants to explore research opportunities in this cutting-edge field. Attendees expressed their appreciation for Dr Pandey's engaging presentation and practical insights into the future of targeted therapeutics.

Moments of session:
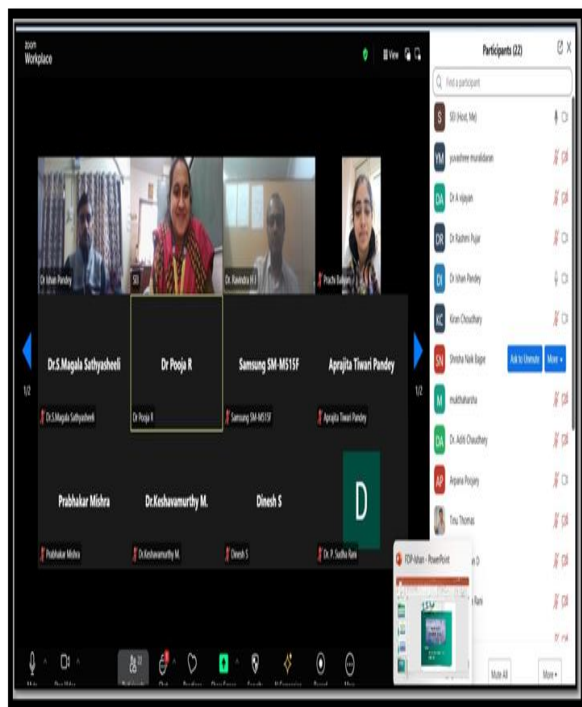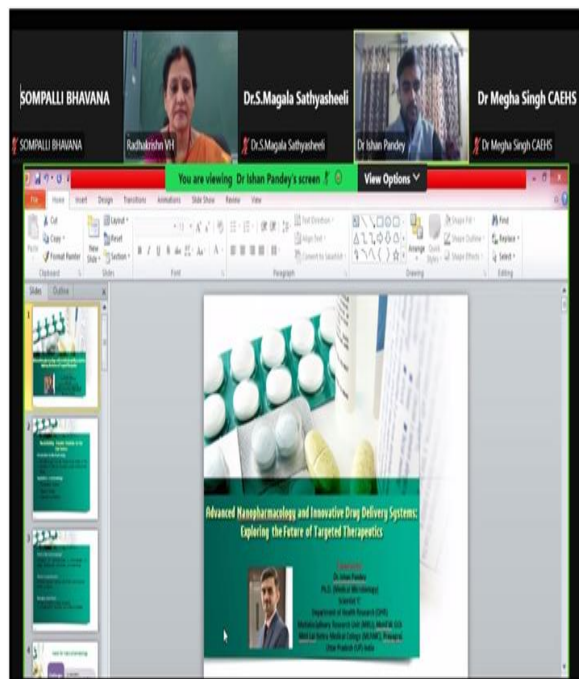
Technical Session 2

Date: 21st January 2025.

Time: 2:00-3:30 PM

Resource Person: Dr. Uma Kumari (Professor and Senior Bioinformatics Scientist), BPRI (Bioinformatics Research Institute), Noida

Topic: In Silico Prediction of Drug Efficacy and Toxicity: Transforming Drug Discovery and Development

Report on Technical Session 2

The second technical session of the Five-Day Faculty Development Program was held on **21st January 2025**. The session featured **Dr. Uma Kumari**, Professor and Senior Bioinformatics Scientist at the **Bioinformatics Research Institute (BPRI), Noida**, as the resource person. The topic of her lecture, **"In Silico Prediction of Drug Efficacy and Toxicity: Transforming Drug Discovery and Development,"** highlighted the critical role of computational tools in modern pharmacology.

Dr. Kumari provided an in-depth overview of how in silico techniques are revolutionizing the drug discovery process by predicting drug efficacy and toxicity early in development. She discussed computational modeling, molecular docking, and AI-driven algorithms as pivotal tools for reducing the time and cost associated with traditional drug development. Emphasizing case studies, she demonstrated the application of bioinformatics in designing safer and more effective therapeutics.

The session also highlighted the integration of big data analytics within silico methods to enhance drug safety profiles and minimize failures in clinical trials. Participants actively engaged with Dr. Kumari through thought-provoking questions, making the session highly interactive and informative. The lecture concluded with a discussion on the future prospects of in silico approaches in personalized medicine. Attendees appreciated Dr. Kumari's expertise and practical insights, describing the session as an eye-opener into the transformative potential of bioinformatics in drug discovery.
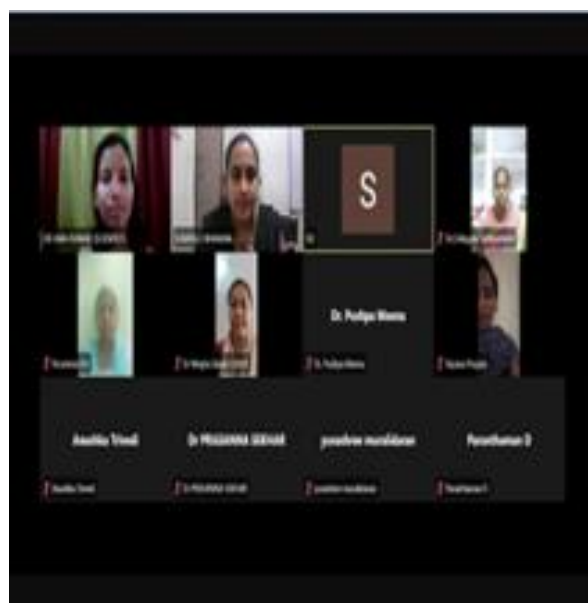
Moments of the session:

Introduction of Speaker

Explanation with Live Example

Session in progress

Technical Session 3

Date: 22nd January 2025

Time: 2:00-3:30 PM

Resource Person: Dr. Jayarama Reddy Professor, Department of Botany, St Joseph's University, Bangalore Bengaluru

Topic: Nanocarriers in Drug Delivery: Innovations and Applications

Report on Technical Session 3

The third technical session of the Faculty Development Program was conducted on **22nd January 2025** from **2:00 PM to 3:30 PM**. The session featured **Dr. Jayarama Reddy**, Professor from the Department of Botany, St. Joseph's University, Bengaluru, as the resource person. The topic, **"Nanocarriers in Drug Delivery: Innovations and Applications,"** focused on the revolutionary role of nanotechnology in enhancing drug delivery systems.

Dr. Reddy explained the design, functionality, and versatility of nanocarriers such as liposomes, dendrimers, and polymeric nanoparticles in achieving targeted drug delivery. He elaborated on their ability to improve bioavailability, reduce toxicity, and enhance therapeutic outcomes in treating complex diseases like cancer and neurodegenerative disorders. The session also highlighted ongoing research and the future potential of nanotechnology in personalized medicine.

Participants actively engaged in the session, posing questions about practical applications and challenges in scaling up these innovations for clinical use. Dr. Reddy's insightful presentation provided attendees with valuable knowledge and inspired further exploration into nanotechnology-driven solutions in pharmacology.

Technical Session 4

Date: 24ᵗʰ Jan 2025

Time: 2:00-3:30 PM

Resource Person: Dr. Mukunthan K Selvam Faculty Biotechnology, Manipal Institute of Technology, Manipal.

Topic: AI and Machine Learning in Drug Development
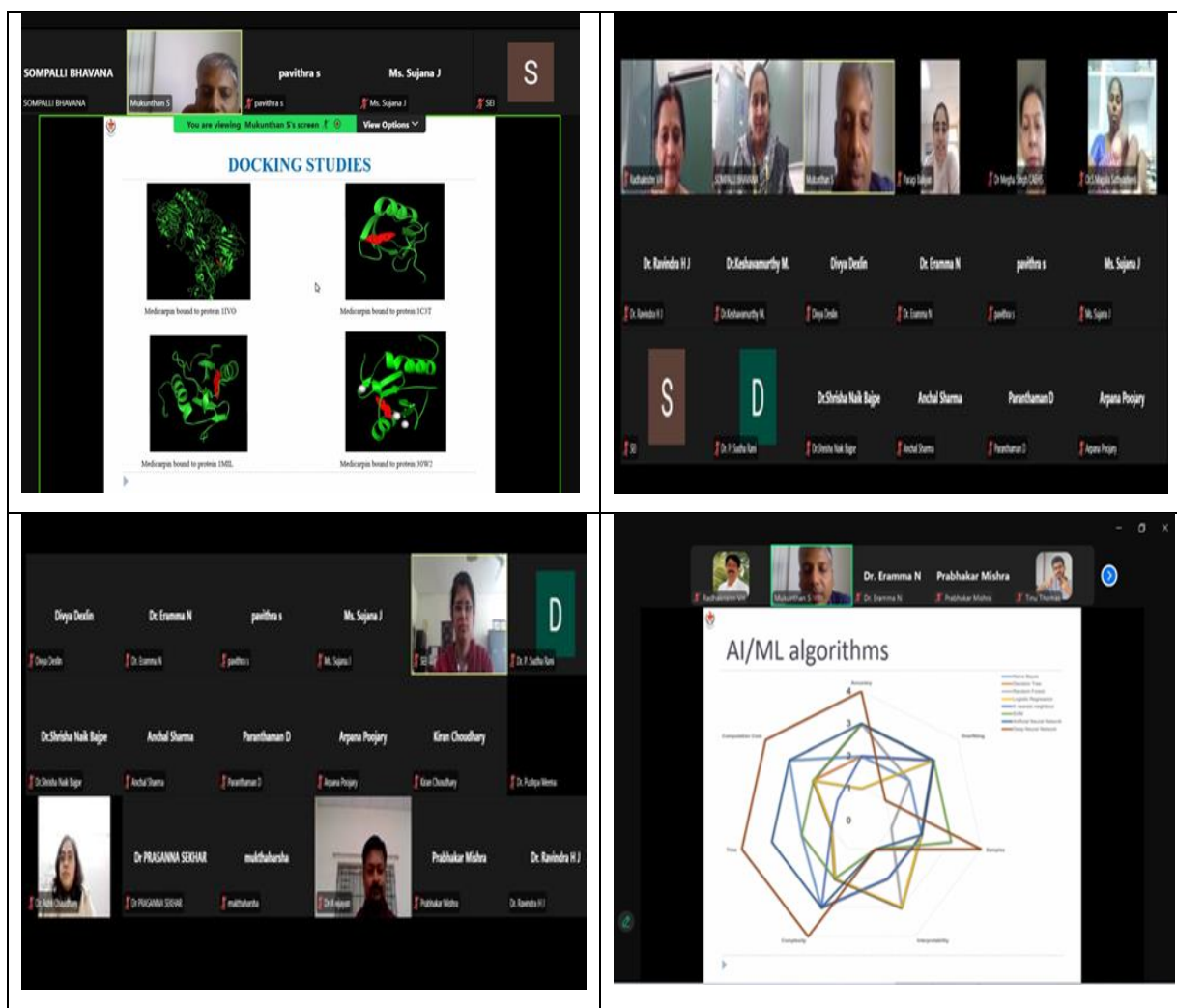
Report on Technical Session 3

The third technical session of the Faculty Development Program was held on **24th January 2025** from **2:00 PM to 3:30 PM**. The session was led by **Dr. Mukunthan K. Selvam**, Faculty of Biotechnology at the **Manipal Institute of Technology, Manipal**. His topic, **"AI and Machine Learning in Drug Development,"** focused on the transformative impact of advanced computational tools in modern pharmacology.

Dr. Selvam highlighted how AI and machine learning are accelerating drug discovery by identifying potential drug candidates, predicting efficacy, and optimizing clinical trial designs. He also discussed the integration of big data and predictive algorithms in reducing time and cost in the drug development pipeline. The session included real-world examples, demonstrating how these technologies are being applied to improve precision and efficiency in personalized medicine.

Participants engaged enthusiastically, posing questions on AI applications and the challenges of data integration in drug research. The session concluded with a discussion on the future prospects of AI and machine learning in revolutionizing the pharmaceutical industry. Dr. Selvam's insights were highly appreciated, and attendees found the session both informative and inspiring.

Moments of the session:

Technical Session 5

Date: 25th Jan 2025

Time: 2:00-3:30 PM

Resource Person: Dr. Rajesh Ramachandran, Professor, CHRIST University, Bangalore.

Topic: Big Data in Pharmacological Research

On **25th January 2025**, from **2:00 PM to 3:30 PM**, the fifth technical session of the series was conducted on the topic **"Big Data in Pharmacological Research."** The session was led by **Dr. Rajesh Ramachandran**, a distinguished Professor from CHRIST University, Bangalore. Known for his extensive expertise in data-driven research and pharmacology, Dr. Rajesh provided invaluable insights into the evolving role of big data in transforming pharmacological research and its applications.

The session began with an introduction to the concept of big data, where Dr. Rajesh elaborated on its five key characteristics: volume, velocity, variety, veracity, and value. He explained how these attributes play a crucial role in pharmacological research by enabling the management of vast datasets generated from clinical trials, patient records, and drug development processes. He emphasized how the integration of big data tools has become indispensable for identifying patterns, predicting drug efficacy, and optimizing treatment protocols.

Dr. Rajesh further delved into the applications of big data in drug discovery and development. He shared examples of how pharmaceutical companies and researchers leverage data analytics and machine learning algorithms to identify potential drug candidates, assess their effectiveness, and reduce the time and cost associated with traditional research methods. He also highlighted the use of big data in real-time monitoring of clinical trials, which facilitates the early detection of anomalies and ensures patient safety.

A significant portion of the session was dedicated to discussing personalized medicine, where Dr. Rajesh emphasized how big data enables tailoring treatments based on individual genetic profiles and health data. He explained how genomic data analysis, combined with machine learning, is revolutionizing the way diseases are diagnosed and treated, leading to more precise and effective healthcare interventions. Furthermore, he discussed the role of big data in improving pharmacovigilance, ensuring drug safety by monitoring and analyzing adverse drug reactions on a large scale.

The session concluded with an engaging Q&A segment, where participants actively interacted with Dr. Rajesh. He addressed queries related to the challenges of data integration, ethical concerns surrounding patient data privacy, and the need for interdisciplinary collaboration between data scientists and pharmacologists. Dr. Rajesh underscored the importance of developing robust data governance policies to address these challenges effectively.
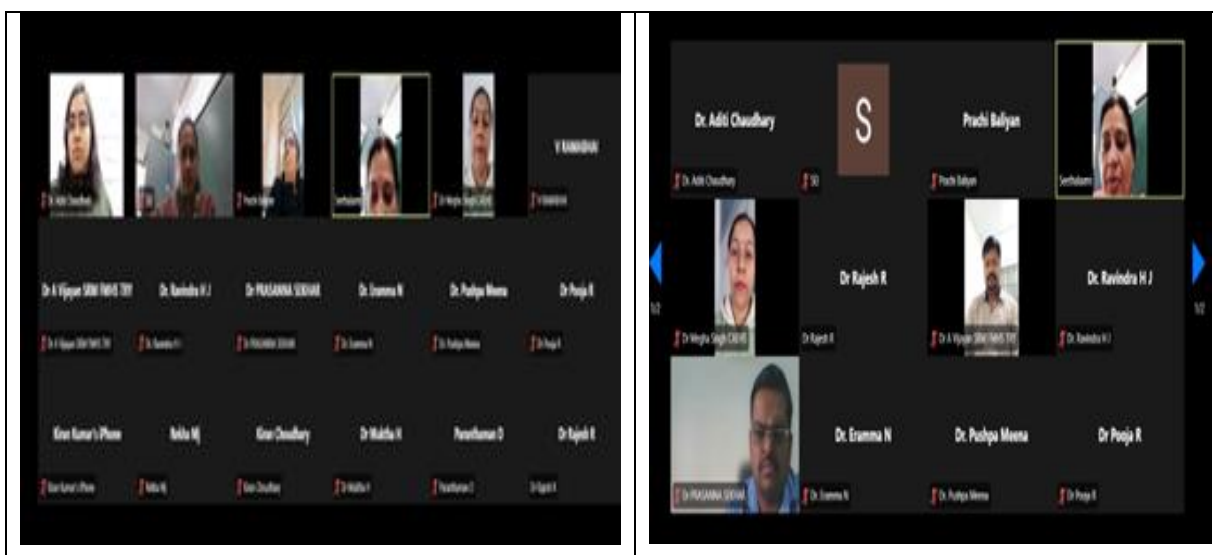
Overall, the session provided attendees with a profound understanding of the transformative potential of big data in pharmacological research. It emphasized how data-driven approaches are not only enhancing the efficiency of drug development but are also paving the way for groundbreaking advancements in personalized medicine and healthcare. The

participants left with a deeper appreciation for the role of big data in shaping the future of pharmacology.

Moments of the session:

Valedictory Function:

The **Valedictory Function** of the event was a fitting conclusion to the enriching 5 daya series of sessions, bringing together participants, resource persons, and organizers in a spirit of celebration and gratitude. The function began with a warm welcome and reflections on the highlights of the program, showcasing the valuable insights and knowledge imparted by esteemed speakers. The organizers emphasized the importance of applying the learnings from these sessions to real-world challenges, inspiring participants to strive for excellence in their respective fields. Heartfelt thanks were extended to all contributors, including the organizing team, resource persons, and attendees, for their commitment and active engagement. The function concluded on a high note with a pledge to continue fostering collaboration and innovation in future endeavours.

Annexure

Program Schedule

RESEARCH & DEVELOPMENT CELL, DEPARTMENT OF BIOTECHNOLOGY

in Association with

KARNATAKA SCIENCE AND TECHNOLOGY ACADEMY,

Five Days Faculty Development Program on

Integrating Data Analytics with Nanotechnology in Pharmacology: Paving the Way for Innovative Drug Development

Date & Time: Jan 20-01-2025 to 24-01-2025; 2:00 to 4:00 PM (IST)

Platform: Zoom (Online Mode)

PROGRAM SCHEDULE

Date	Program	Time	Host
	Day 1 & 2: Pharmacology		
20-01-2025	Login _ Participants & Resource Person	1:15 onwards	
	Inauguration & Program Highlight	1:40-1:45 PM	Dr Pooja R
	Briefing _Research & Consultancy Cell	1:45-1:55 PM	Dr Vanishree, Dean, SEI
	Welcome _Resource Person & Participants	1:55-2:00 PM	Dr. Sompalli Bhavana
	Technical Session 1	2:00-3:30 PM	**Resource Person:** Dr. Ishan Pandey Scientist-C, DHR-MRU, Moti Lal Nehru Medical College (MLNMC), Prayagraj **Topic:** Advanced Nano pharmacology and Innovative Drug Delivery Systems: Exploring the Future of Targeted Therapeutics

	Q & A Session		3:30-3:45 PM
	Vote of Thanks	3:45-3:50 PM	Dr Seethalaxmi
	Photo Session (Online)		3:50-4:00 PM
21-01-2025	Login Participants & Resource Person		1:15 onwards
	Welcome Resource Person & Participants	1:55-2:00 PM	Dr. Sompalli Bhavana
	Technical Session 2	2:00-3:30 PM	**Resource Person:** Dr. Uma Kumari (Professor and Senior Bioinformatics Scientist), BPRI (Bioinformatics Research Institute), Noida **Topic:** In Silico Prediction of Drug Efficacy and Toxicity: Transforming Drug Discovery and Development
	Q & A Session		3:30-3:45 PM
	Vote of Thanks	3:45-3:50 PM	Dr Seethalaxmi
	Photo Session (Online)	3:50-4:00 PM	
Day 3: Nanotechnology		
22-01-2025	Login _ Participants & Resource Person		1:15 onwards
	Welcome Resource Person & Participants	1:55-2:00 PM	Dr Seethalaxmi
	Technical Session 3	2:00-3:30 PM	**Resource Person:** Dr. Jayarama Reddy Professor, Department of Botany, St Joseph's University, Bangalore Bengaluru **Topic:** Nanocarriers in Drug Delivery: Innovations and Applications
	Q & A Session	3:30-3:45 PM	
	Vote of Thanks	3:45-3:50 PM	Dr Farzana Tasneem MI
	Photo Session (Online)	3:50-4:00 PM	
Day 4 & 5: Data Analytics		
23-01-2025	Login Participants & Resource Person		1:15 onwards
	Welcome Resource Person & Participants	1:55-2:00 PM	Dr Pooja R
	Technical Session 3	2:00-3:30 PM	**Resource Person:** Dr. Mukunthan K Selvam

|			
			Faculty Biotechnology, Manipal Institute of Technology, Manipal. **Topic:** AI and Machine Learning in Drug Development
	Q & A Session		3:30-3:45 PM
	Vote of Thanks	3:45-3:50 PM	Dr Farzana Tasneem MI
	Photo Session (Online)		3:50-4:00 PM
24-01-2025	Login _ Participants & Resource Person		1:15 onwards
	Welcome Resource Person & Participants	1:55-2:00 PM	Dr Pooja R
	Technical Session 3	2:00-3:30 PM	**Resource Person:** Dr. Rajesh Ramachandran, Professor, CHRIST University, Bangalore. **Topic:** Big Data in Pharmacological Research
	Q & A Session		3:30-3:45 PM
	Vote of Thanks	3:45-3:50 PM	Dr Farzana Tasneem MI
	Photo Session (Online)		3:50-4:00 PM

Feed Back:

Session 1: Dr Ishan Pandey

How would you rate the Session 1 - Dr. Ishan Pandey_ Advanced Nano pharmacology and Innovative Drug Delivery Systems: Exploring the Future of Targeted Therapeutics

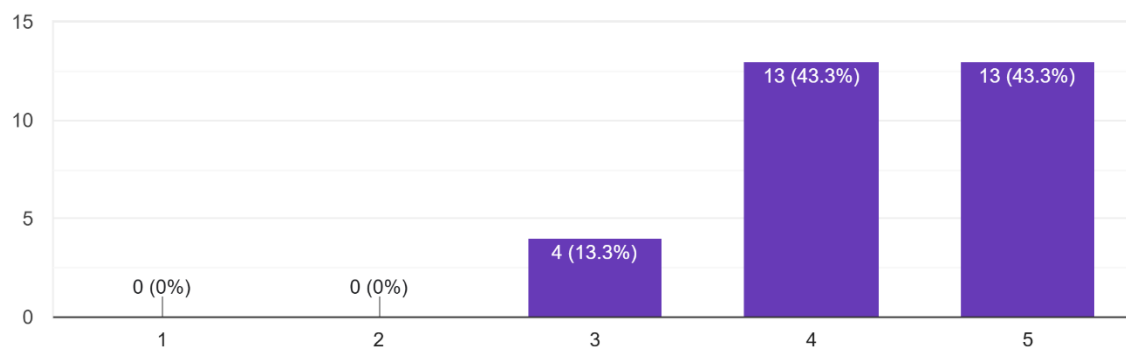How do you rate overall sessions of Dr. Ishan Pandey
30 responses
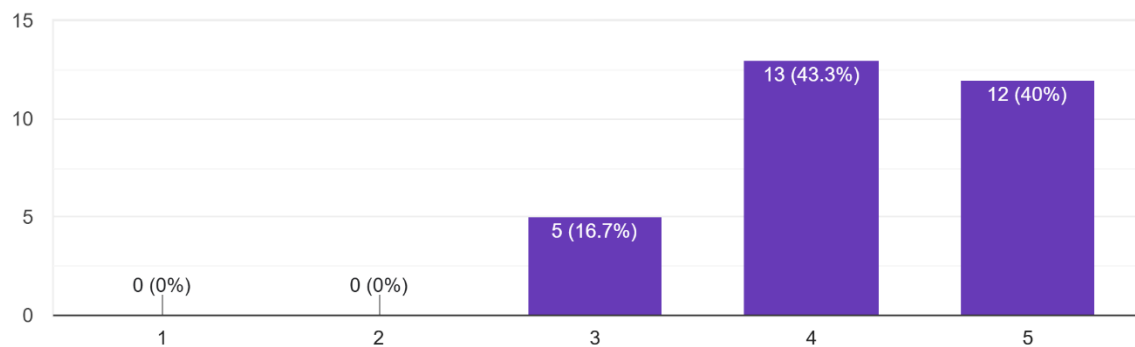
2. Session 2: Dr Uma Kumari

How would you rate the Session 2 - Dr. Uma Kumari_In Silico Prediction of Drug Efficacy and Toxicity: Transforming Drug Discovery and Development

How do you rate overall sessions of Dr. Uma Kumari
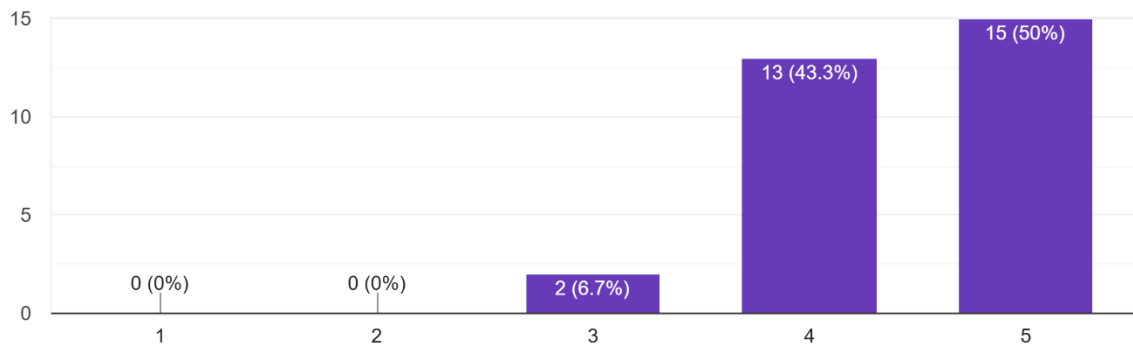30 responses

3. Session 3: Dr Jayaram Reddy

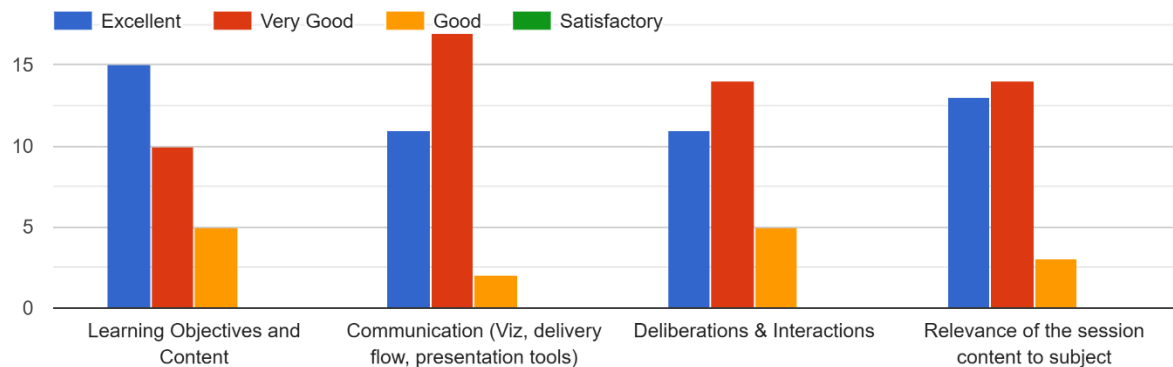How would you rate the Session 3 - Dr. Jayarama Reddy_Nanocarriers in Drug Delivery: Innovations and Applications

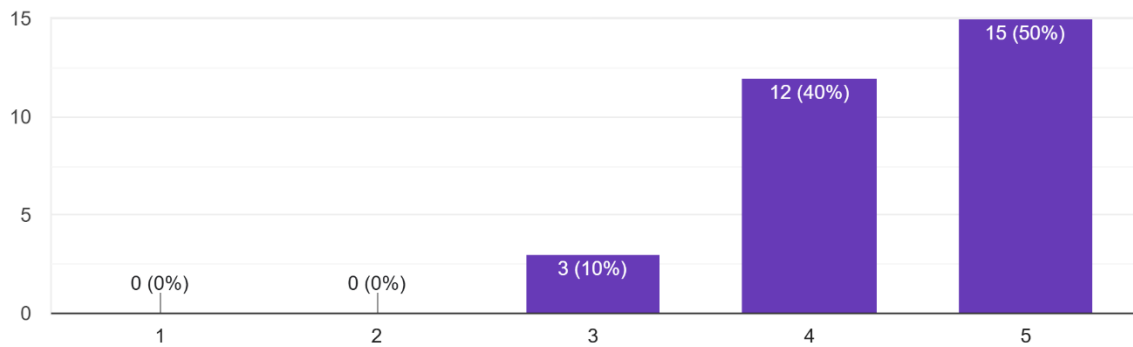How do you rate overall sessions of Dr. Jayarama Reddy

30 responses

4, Session 4: Dr Mukunthan K Selvam

How would you rate the Session 4 -Dr. Mukunthan K Selvam_AI and Machine Learning in Drug Development

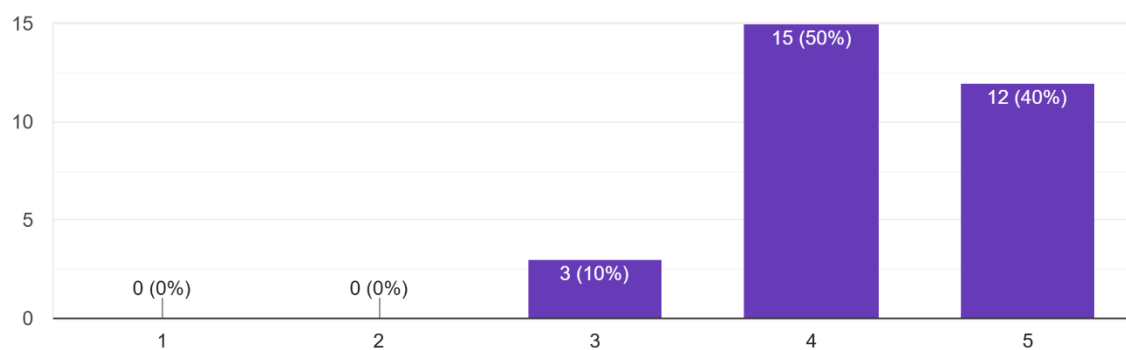How do you rate overall sessions of -Dr. Mukunthan K Selvam

30 responses

5. Session 5: Dr Rajesh Ramachandran

How would you rate the Session 5 -Dr. Rajesh Ramachandran_Big Data in Pharmacological Research

How do you rate overall sessions of Dr. Rajesh Ramachandran

30 responses

Which aspects of the FDP did you find the most valuable?

30 responses

Interdisciplinary approach

Everything was good

All sessions

Nano carriers in Drug Delivery

AI role in drug discovery and development. I found this lecture very useful and interesting.

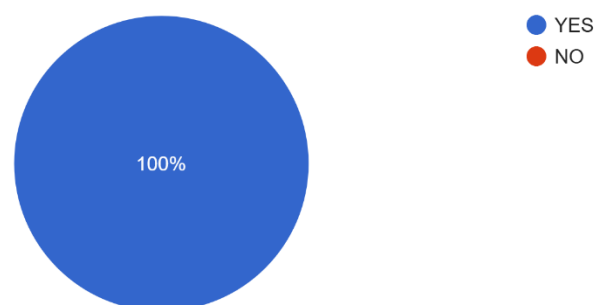The talks were insightful and knowledgeable

DAY 2 and DAY 3

Application of data in pharmacological study
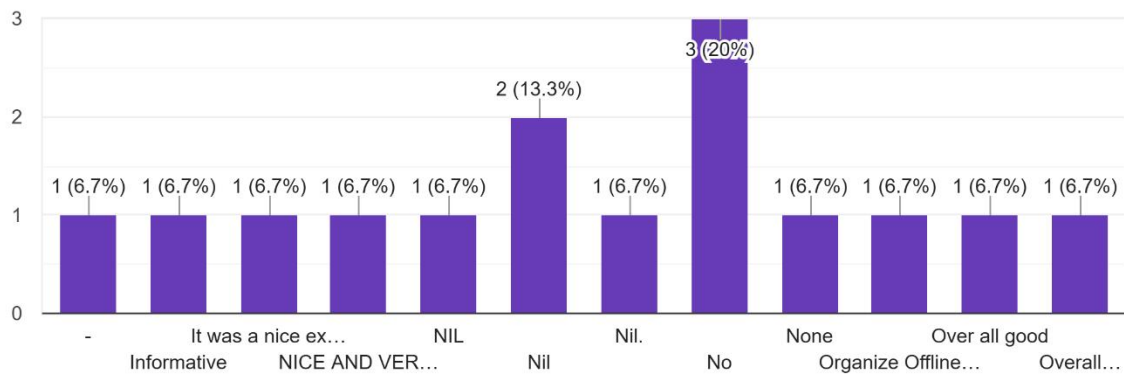
Content delivery

Would you like to attend similar programs in the future?

30 responses

- YES
- NO

100%

Any other Suggestions Comments?

15 responses

Head of the Institution

Dr. Veena K N
Principal, Surana College Autonomous

Convener
Dr Vanishree M.R.
Dean, Research and Development Cell
Surana Educational Institutions (SEI)

Dr. Farzana Tasneem MI
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Department of Sciences, Surana College Autonomous

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Dr Seethalaxmi
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